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=> s rad51 (p) (tumor suppressor or BRCA? or p53)

             5 RAD51
         20663 TUMOR
         14557 TUMORS
         24936 TUMOR
                 (TUMOR OR TUMORS)
          6477 SUPPRESSOR
          2237 SUPPRESSORS
          7601 SUPPRESSOR
                 (SUPPRESSOR OR SUPPRESSORS)
           584 TUMOR SUPPRESSOR
                 (TUMOR(W)SUPPRESSOR)
            82 BRCA?
           953 P53
L1           0 RAD51 (P) (TUMOR SUPPRESSOR OR BRCA? OR P53)

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=> s rad51 and (tumor suppressor or BRCA? or p53)

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L2 ANSWER 1 OF 36 BIOSIS COPYRIGHT 1999 BIOSIS
AN 1999:2904 BIOSIS
DN PREV199900002904
TI The **BRCA2** gene product functionally interacts with **p53** and **RAD51**.
AU Marmorstein, Lihua Y.; Ouchi, Toru; Aaronson, Stuart A. (1)
CS (1) Mount Sinai Med. Cent., One Gustave L. Levy Place, New York, NY 10029 USA
SO Proceedings of the National Academy of Sciences of the United States of America, (Nov. 10, 1998) Vol. 95, No. 23, pp. 13869-13874. ISSN: 0027-8424.
DT Article
LA English
AB Germ-line mutations in the human **BRCA2** gene confer susceptibility to breast cancer. Efforts to elucidate its function have revealed a putative transcriptional activation domain and in vitro interaction with the DNA repair protein **RAD51**. Other studies have indicated that **RAD51** physically associates with the **p53 tumor suppressor** protein. Here we show that the **BRCA2** gene product is a 460-kDa nuclear phosphoprotein, which forms in vivo complexes with both **p53** and **RAD51**. Moreover, exogenous **BRCA2** expression in cancer cells inhibits **p53**'s transcriptional activity, and **RAD51** coexpression enhances **BRCA2** 's inhibitory effects. These findings demonstrate that **BRCA2** physically and functionally interacts with two key components of cell cycle control and DNA repair pathways. Thus, **BRCA2** likely participates with **p53** and **RAD51** in maintaining genome integrity.

L2 ANSWER 2 OF 36 MEDLINE DUPLICATE 1
AN 1998226807 MEDLINE
DN 98226807
TI The BRC repeats in **BRCA2** are critical for **RAD51** binding and resistance to methyl methanesulfonate treatment.
AU Chen P L; Chen C F; Chen Y; Xiao J; Sharp Z D; Lee W H
CS Department of Molecular Medicine and Institute of Biotechnology, University of Texas Health Science Center, San Antonio, TX 78245, USA.
NC P50-CA58183 (NCI)
SO PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA, (1998 Apr 28) 95 (9) 5287-92. Journal code: PV3. ISSN: 0027-8424.
CY United States
DT Journal; Article; (JOURNAL ARTICLE)
LA English
FS Priority Journals; Cancer Journals
EM 199808
EW 19980801
AB The **BRCA2** gene was identified based on its involvement in familial breast cancer. The analysis of its sequence predicts that the gene encodes a protein with 3,418 amino acids but provides very

few clues pointing to its biological function. In an attempt to address this question, specific antibodies were prepared that identified the gene product of **BRCA2** as a 390-kDa nuclear protein. Furthermore, direct binding of human **RAD51** to each of the four single 30-amino acid BRC repeats located at the 5' portion of exon 11 of **BRCA2** was demonstrated. Such an interaction is significant, as **BRCA2** and **RAD51** can be reciprocally coimmunoprecipitated by each of the individual, specific antibodies and form complexes in vivo. Inferring from the function of **RAD51** in DNA repair, human pancreatic cancer cells, Capan-1, expressing truncated **BRCA2** were shown to be hypersensitive to methyl methanesulfonate (MMS) treatment. Exogenous expression of wild-type **BRCA2**, but not BRC-deleted mutants, in Capan-1 cells confers resistance to MMS treatment. These results suggest that the interaction between the BRC repeats of **BRCA2** and **RAD51** is critical for cellular response to DNA damage caused by MMS.

L2 ANSWER 3 OF 36 MEDLINE DUPLICATE 2
AN 1998175545 MEDLINE
DN 98175545
TI **BRCA1** up-regulation is associated with repair-mediated resistance to cis-diamminedichloroplatinum(II).
AU Husain A; He G; Venkatraman E S; Spriggs D R
CS Department of Surgery, Memorial Sloan-Kettering Cancer Center, New York, New York 10021, USA.
SO CANCER RESEARCH, (1998 Mar 15) 58 (6) 1120-3.
Journal code: CNF. ISSN: 0008-5472.
CY United States
DT Journal; Article; (JOURNAL ARTICLE)
LA English
FS Priority Journals; Cancer Journals
EM 199806
EW 19980602
AB We sought to identify novel genes associated with cis-diamminedichloroplatinum(II) (CDDP) resistance, and by differential display analysis, we found that the human breast and ovarian cancer susceptibility gene **BRCA1** was overexpressed in CDDP-resistant MCF-7 cells. A recent report that **BRCA1** and human **Rad51** colocalize in S-phase cells suggests a role for **BRCA1** in DNA damage repair. We hypothesized that **BRCA1** plays a role in DNA damage repair-mediated CDDP resistance. In CCDP-resistant variants of breast and ovarian carcinoma cell lines, MCF-7 CDDP/R and SKOV-3 CDDP/R, we found increased levels of **BRCA1** protein, and we determined that the SKOV-3 CDDP/R cell line is significantly more proficient at DNA damage repair. Antisense inhibition of **BRCA1** in this cell line resulted in an increased sensitivity to CDDP, a decreased proficiency of DNA repair, and an enhanced rate of apoptosis. These data support the hypothesis that **BRCA1** is a gene involved in DNA damage repair.

L2 ANSWER 4 OF 36 MEDLINE DUPLICATE 3
AN 1998369178 MEDLINE
DN 98369178
TI **BRCA1** required for transcription-coupled repair of oxidative DNA damage.
AU Gowen L C; Avrutskaya A V; Latour A M; Koller B H; Leadon S A
CS Curriculum in Genetics and Molecular Biology and Department of Medicine, University of North Carolina at Chapel Hill, Chapel Hill,

NC 27599, USA.
NC CA70490 (NCI)
IP50CA58223 (NCI)
CA40453 (NCI)
SO SCIENCE, (1998 Aug 14) 281 (5379) 1009-12.
Journal code: UJ7. ISSN: 0036-8075.
CY United States
DT Journal; Article; (JOURNAL ARTICLE)
LA English
FS Priority Journals; Cancer Journals
EM 199810
EW 19981005
AB The breast and ovarian cancer susceptibility gene **BRCA1** encodes a zinc finger protein of unknown function. Association of the **BRCA1** protein with the DNA repair protein **Rad51** and changes in the phosphorylation and cellular localization of the protein after exposure to DNA-damaging agents are consistent with a role for **BRCA1** in DNA repair. Here, it is shown that mouse embryonic stem cells deficient in **BRCA1** are defective in the ability to carry out transcription-coupled repair of oxidative DNA damage, and are hypersensitive to ionizing radiation and hydrogen peroxide. These results suggest that **BRCA1** participates, directly or indirectly, in transcription-coupled repair of oxidative DNA damage.

L2 ANSWER 5 OF 36 BIOSIS COPYRIGHT 1999 BIOSIS
AN 1999:7824 BIOSIS
DN PREV199900007824
TI Regulation by ionizing radiation of CDC2, cyclin A, cyclin B, thymidine kinase, topoisomerase IIalpha, and **RAD51** expression in normal human diploid fibroblasts is dependent on **p53**/p21Waf1 1.
AU de Toledo, Sonia M.; Azzam, Edouard I.; Keng, Peter; Laffrenier, Shelley; Little, John B. (1)
CS (1) Lab. Radiobiology, Harvard School Public Health, 665 Huntington Avenue, Boston, MA 02115 USA
SO Cell Growth & Differentiation, (Nov., 1998) Vol. 9, No. 11, pp. 887-896.
ISSN: 1044-9523.
DT Article
LA English
AB Induced cell cycle delays were among the first described cellular responses to ionizing radiation (IR). To understand the sensitivity and the molecular events involved in the response to low doses of IR and to examine the role of **p53** and its downstream effector p21Waf1, we measured changes in expression of genes postulated to be involved in the cellular response to IR. Expression levels were examined in normal human diploid fibroblasts irradiated and maintained in quiescent density-inhibited growth up to 24-48 h after exposure to X-ray doses as low as 0.1-0.3 Gy, which have negligible effects on cell survival. Among 31 genes analyzed, we observed down-regulation in response to IR of the mRNA levels of CDC2, cyclin A cyclin B, thymidine kinase, topoisomerase IIalpha, and **RAD51**. A similar reduction in the expression levels of these genes occurred when irradiated cells were released from confluence and allowed to proliferate. This was not observed in cells in which **p53** function was defective and up-regulation of p21Waf1 levels either did not occur (E6 transfected normal human fibroblasts and Li-Fraumeni fibroblasts) or was delayed (ataxia telanglectasia fibroblasts) after irradiation. Downregulation was also absent in

p21Waf1-null mouse embryo fibroblasts (MEFs) but occurred at a lower level in **p53**-null MEFs, due to slight increases in p21Waf1 levels by a **p53**-independent pathway. These findings indicate that the down-regulation of these cell cycle regulated genes in irradiated cells is **p53**-dependent and involves its effector p21Waf1. Although no downregulation in the expression of genes involved in G2-M was observed in **p53** or in p21Waf1-null MEFs, these cells showed a G2-M delay after irradiation, indicating that the expression levels of these genes does not regulate the G2-M delay.

L2 ANSWER 6 OF 36 MEDLINE DUPLICATE 4
AN 1998438757 MEDLINE
DN 98438757
TI Nonsense mutation at codon 63 of the **BRCA1** gene in Japanese breast cancer patients.
AU Kijima G; Murakami Y; Ohuchi N; Satomi S; Sekiya T
CS Oncogene Division, National Cancer Center Research Institute, Tokyo.
SO JAPANESE JOURNAL OF CANCER RESEARCH, (1998 Aug) 89 (8) 837-41. Journal code: HBA. ISSN: 0910-5050.
CY Japan
DT Journal; Article; (JOURNAL ARTICLE)
LA English
FS Priority Journals; Cancer Journals
EM 199901
EW 19990104
AB The involvement of abnormalities of the **BRCA1** gene in breast cancers in Japanese patients without any family history of this cancer was investigated by polymerase chain reaction-based single-strand conformation polymorphism analysis of the DNA sequences corresponding to the zinc finger domain (exons 2, 3 and 5) and the binding domain with **Rad51** (exon 11) of the **BRCA1** protein. An identical nonsense mutation at codon 63 (TTA to TAA) was found in 2 of 56 (3.5%) breast cancers from independent patients. The nucleotide change was also detected in the DNAs from non-cancerous tissues of both patients and therefore was a germline mutation. One of the patients was a member of a pedigree involving 3 ovarian cancer and 1 gastric cancer patients, while the other patient had no family history of malignancy. The same germline mutation at codon 63 was reported in four other independent Japanese pedigrees with frequent breast cancer, but not in such families in other countries. These observations suggest that the mutation commonly originated from a single Japanese ancestor. No other mutation of the **BRCA1** gene was observed in the samples analyzed in this study. A low incidence of germline mutation and the absence of somatic mutation suggest that the aberration of the **BRCA1** gene is involved only in a subset of Japanese breast cancers.

L2 ANSWER 7 OF 36 MEDLINE
AN 1999021427 MEDLINE
DN 99021427
TI Intercellular communication is involved in the bystander regulation of gene expression in human cells exposed to very low fluences of alpha particles.
AU Azzam E I; de Toledo S M; Gooding T; Little J B
CS Department of Cancer Cell Biology, Harvard School of Public Health, Boston, Massachusetts 02115, USA.
NC CA-47542 (NCI)
ES-00002 (NIEHS)

SO RADIATION RESEARCH, (1998 Nov) 150 (5) 497-504.
Journal code: QMP. ISSN: 0033-7587.
CY United States
DT Journal; Article; (JOURNAL ARTICLE)
LA English
FS Priority Journals; Cancer Journals
EM 199901
EW 19990104
AB We demonstrate by western analysis that the expression levels of TP53 (formerly known as **p53**), CDKN1A (formerly known as p21Waf1), CDC2 (formerly known as p34cdc2), CCNB1 (cyclin B1) and **RAD51** are significantly modulated in confluent, density-inhibited human diploid cell populations exposed to doses where only a small fraction of the nuclei are actually traversed by an alpha-particle track. The extent of modulation of TP53 and CDKN1A is significantly reduced in the presence of the gap junction inhibitor lindane and in irradiated low-density cell populations. In situ immunofluorescence studies show that at doses where about 2% of the nuclei would be traversed by an alpha particle, induction of CDKN1A occurs in more cells than predicted. Furthermore, the induced cells are present in isolated aggregates of neighboring cells. Therefore, our studies at the gene expression level indicate that similar signaling pathways are induced in bystander cells that are not traversed by an alpha particle as in traversed cells, and that biological effects in cell populations are not restricted to the response of individual cells to the DNA damage they receive.

L2 ANSWER 8 OF 36 MEDLINE DUPLICATE 5
AN 1998448096 MEDLINE
DN 98448096
TI Stable interaction between the products of the **BRCA1** and **BRCA2 tumor suppressor** genes in mitotic and meiotic cells.
AU Chen J; Silver D P; Walpita D; Cantor S B; Gazdar A F; Tomlinson G; Couch F J; Weber B L; Ashley T; Livingston D M; Scully R
CS Dana Farber Cancer Institute, Harvard Medical School, Boston, Massachusetts 02115, USA.
SO Mol Cell, (1998 Sep) 2 (3) 317-28.
Journal code: C5E. ISSN: 1097-2765.
CY United States
DT Journal; Article; (JOURNAL ARTICLE)
LA English
FS Priority Journals
EM 199901
EW 19990104
AB **BRCA1** and **BRCA2** account for most cases of familial, early onset breast and/or ovarian cancer and encode products that each interact with hRAD51. Results presented here show that **BRCA1** and **BRCA2** coexist in a biochemical complex and colocalize in subnuclear foci in somatic cells and on the axial elements of developing synaptonemal complexes. Like **BRCA1** and **RAD51**, **BRCA2** relocates to PCNA+ replication sites following exposure of S phase cells to hydroxyurea or UV irradiation. Thus, **BRCA1** and **BRCA2** participate, together, in a pathway(s) associated with the activation of double-strand break repair and/or homologous recombination. Dysfunction of this pathway may be a general phenomenon in the majority of cases of hereditary breast and/or ovarian cancer.

L2 ANSWER 9 OF 36 MEDLINE
AN 1998344188 MEDLINE
DN 98344188
TI Breast cancer and genetic instability: the molecules behind the scenes.
AU Feunteun J
CS Laboratoire de Genetique Oncologique, CNRS UMR 1599, Institut Gustave Roussy, Villejuif, France.. feunteun@igr.fr
SO MOLECULAR MEDICINE TODAY, (1998 Jun) 4 (6) 263-7. Ref: 31
Journal code: CMK. ISSN: 1357-4310.
CY ENGLAND: United Kingdom
DT Journal; Article; (JOURNAL ARTICLE)
General Review; (REVIEW)
(REVIEW, TUTORIAL)
LA English
FS Priority Journals
EM 199812
EW 19981202
AB Germline mutations in either the **BRCA1** or the **BRCA2** gene are responsible for the majority of hereditary breast cancers. The proposition that **BRCA1** might play a role as a caretaker of the genome was first put forward by the demonstration that, in mitotic and meiotic cells, **BRCA1** can interact with **Rad51**, which plays a major role in repair and/or recombination processes. From there, a fair body of observations have converged to support the concept that **BRCA1** and **BRCA2** play a role in monitoring and/or repairing DNA lesions. The relaxation of this monitoring caused by mutations of either of these two genes leaves unrepaired events, leading to the accumulation of mutations and ultimately to cancer. Understanding the precise biochemical function of **BRCA1** and **BRCA2** should provide a basis for early diagnosis and prevention in women carrying a predisposition to breast cancer.

L2 ANSWER 10 OF 36 MEDLINE DUPLICATE 6
AN 1998431531 MEDLINE
DN 98431531
TI [Is hereditary predisposition to breast cancer linked to **BRCA1** a disease of response to genotoxic lesions?]. La predisposition hereditaire au cancer du sein liee `a **BRCA1** est-elle une maladie de la reponse aux lesions genotoxiques?.
AU Feunteun J
CS Laboratoire de Genetique oncologique, CNRS UMR #1599, Institut Gustave-Roussy, Villejuif.
SO COMPTES RENDUS DES SEANCES DE LA SOCIETE DE BIOLOGIE ET DE SES FILIALES, (1998) 192 (2) 235-40. Ref: 36
Journal code: CA2. ISSN: 0037-9026.
CY France
DT Journal; Article; (JOURNAL ARTICLE)
General Review; (REVIEW)
(REVIEW, TUTORIAL)
LA French
FS Priority Journals
EM 199901
EW 19990104
AB Germline mutations in either the **BRCA1** or the **BRCA2** gene are responsible for the majority of hereditary breast cancers. The proposition that **BRCA1** may play a role as a caretaker of the genome, was first put forward by the

demonstration that, in mitotic and meiotic cells, **BRCA1** can interact with **Rad51**, a major actor in repair and/or recombination processes. From there, a fair body of observations have converged to support the concept that **BRCA1** and **BRCA2** play a role in monitoring and/or repairing DNA lesions. The relaxation in this monitoring, due to mutations of either of these two genes, leaves unrepaired events and leads to the accumulation of mutations and ultimately to cancer. Understanding the precise biochemical function of **BRCA1** and **BRCA2** should provide basis for early diagnosis and prevention in women carrying a predisposition to breast cancer.

DUPLICATE 7

L2 ANSWER 11 OF 36 MEDLINE
AN 1998183797 MEDLINE
DN 98183797
TI Multiple possible sites of **BRCA2** interacting with DNA repair protein **RAD51**.
AU Katagiri T; Saito H; Shinohara A; Ogawa H; Kamada N; Nakamura Y; Miki Y
CS Department of Human Genome Analysis, Japanese Foundation for Cancer Research, Tokyo, Japan.
SO GENES, CHROMOSOMES AND CANCER, (1998 Mar) 21 (3) 217-22. Journal code: AYV. ISSN: 1045-2257.
CY United States
DT Journal; Article; (JOURNAL ARTICLE)
LA English
FS Priority Journals
EM 199807
EW 19980702
AB To investigate the biological consequences of aberrant **BRCA2** protein during mammary carcinogenesis, we attempted to identify proteins that normally interact with **BRCA2**. By using a yeast two-hybrid system with a hybrid protein that contained residues 639-1,508 of **BRCA2** protein fused to the GAL4 DNA-binding domain, we isolated five independent cDNA clones that encoded parts of **RAD51** protein, a human homolog of bacterial RecA. In vitro experiments using anti-**RAD51** antibody confirmed interaction of **BRCA2** with **RAD51** . The **RAD51**-binding region of **BRCA2** detected in the present study was distinct from the region reported recently. Further studies using smaller portions of **BRCA2** defined at least two additional **RAD51**-binding domains, residues 982-1,066 and 1,139-1,266. Our results suggest that **BRCA2** can interact with **RAD51** through multiple sites of **BRCA2** and that control of mitotic and meiotic recombination and/or of genomic integrity through binding to **RAD51** may be a crucial mechanism by which **BRCA2** suppresses abnormal proliferation of mammary cells.

L2 ANSWER 12 OF 36 BIOSIS COPYRIGHT 1999 BIOSIS
AN 1998:384258 BIOSIS
DN PREV199800384258
TI Overexpression of **Rad51** in pancreatic ducts of tumour surrounding tissue.
AU Stuerzbecher, H.-W. (1); Heymann, S. (1); Luettges, F.; Kalthoff, H.; Maacke, H. (1)
CS (1) Inst. f. Hum. Gen., Med. Univ., Ratzeburger Allee 160, D-23538 Luebeck Germany
SO European Journal of Cell Biology, (1998) Vol. 75, No. SUPPL. 48, pp. 53.

Meeting Info.: 22nd Annual Meeting of the Deutsche Gesellschaft fuer Zellbiologie (German Society for Cell Biology) Saarbruecken, Germany March 15-19, 1998 German Society for Cell Biology
. ISSN: 0171-9335.
DT Conference
LA English

L2 ANSWER 13 OF 36 BIOSIS COPYRIGHT 1999 BIOSIS
AN 1998:384251 BIOSIS
DN PREV199800384251
TI Establishment and characterisation of an inducible **Rad51** overexpressing cell line.
AU Miska, S.; Stuerzbecher, H.-W.
CS Inst. f. Hum. Gen., Med. Univ., Ratzeburger Allee 160, D-23538 Luebeck Germany
SO European Journal of Cell Biology, (1998) Vol. 75, No. SUPPL. 48, pp. 51.
Meeting Info.: 22nd Annual Meeting of the Deutsche Gesellschaft fuer Zellbiologie (German Society for Cell Biology) Saarbruecken, Germany March 15-19, 1998 German Society for Cell Biology
. ISSN: 0171-9335.
DT Conference
LA English

L2 ANSWER 14 OF 36 MEDLINE
AN 97271883 MEDLINE
DN 97271883
TI Cancer-susceptibility genes. Gatekeepers and caretakers [news; comment].
CM Comment on: Nature 1997 Apr 24;386(6627):772-3
Comment on: Nature 1997 Apr 24;386(6627):804-10
AU Kinzler K W; Vogelstein B
SO NATURE, (1997 Apr 24) 386 (6627) 761, 763.
Journal code: NSC. ISSN: 0028-0836.
CY ENGLAND: United Kingdom
DT Commentary
News Announcement
LA English
FS Priority Journals; Cancer Journals
EM 199707

L2 ANSWER 15 OF 36 MEDLINE
AN 97355612 MEDLINE
DN 97355612
TI Double indemnity: **p53**, **BRCA** and cancer.
p53 mutation partially rescues developmental arrest in **Brca1** and **Brca2** null mice, suggesting a role for familial breast cancer genes in DNA damage repair [news].
AU Brugarolas J; Jacks T
SO NATURE MEDICINE, (1997 Jul) 3 (7) 721-2. Ref: 24
Journal code: CG5. ISSN: 1078-8956.
CY United States
DT News Announcement
General Review; (REVIEW)
(REVIEW, TUTORIAL)
LA English
FS Priority Journals
EM 199710
EW 19971002

L2 ANSWER 16 OF 36 MEDLINE
AN 1998016394 MEDLINE
DN 98016394
TI No stranger to controversy [editorial].
AU Anonymous
SO NATURE GENETICS, (1997 Nov) 17 (3) 247-8.
Journal code: BRO. ISSN: 1061-4036.
CY United States
DT Editorial
LA English
FS Priority Journals
EM 199802
EW 19980204

L2 ANSWER 17 OF 36 MEDLINE
AN 97284375 MEDLINE
DN 97284375
TI Possible function found for breast cancer genes [news].
AU Marx G
SO SCIENCE, (1997 Apr 25) 276 (5312) 531-2.
Journal code: UJ7. ISSN: 0036-8075.
CY United States
DT News Announcement
LA English
FS Priority Journals; Cancer Journals
EM 199707
EW 19970703

L2 ANSWER 18 OF 36 MEDLINE DUPLICATE 8
AN 1998070349 MEDLINE
DN 98070349
TI **RAD51** interacts with the evolutionarily conserved BRC motifs in the human breast cancer susceptibility gene **brca2**.
AU Wong A K C; Pero R; Ormonde P A; Tavtigian S V; Bartel P L
CS Myriad Genetics, Inc., Salt Lake City, Utah 84108, USA.. alex@myriad.com
SO JOURNAL OF BIOLOGICAL CHEMISTRY, (1997 Dec 19) 272 (51) 31941-4.
Journal code: HIV. ISSN: 0021-9258.
CY United States
DT Journal; Article; (JOURNAL ARTICLE)
LA English
FS Priority Journals; Cancer Journals
EM 199803
EW 19980304
AB Recent work has shown that the murine **BRCA2 tumor suppressor** protein interacts with the murine **RAD51** protein. This interaction suggests that **BRCA2** participates in DNA repair. Residues 3196-3232 of the murine **BRCA2** protein were shown to be involved in this interaction. Here, we report the detailed mapping of additional domains that are involved in interactions between the human homologs of these two proteins. Through yeast two-hybrid and biochemical assays, we demonstrate that the **RAD51** protein interacts specifically with the eight evolutionarily conserved BRC motifs encoded in exon 11 of **brca2** and with a similar motif found in a Caenorhabditis elegans hypothetical protein. Deletion analysis demonstrates that residues 98-339 of human **RAD51** interact with the 59-residue minimal region that is conserved in all BRC motifs. These data suggest that the BRC repeats function to bind **RAD51**.

L2 ANSWER 19 OF 36 MEDLINE DUPLICATE 9
AN 1998038784 MEDLINE
DN 98038784
TI Elevated recombination in immortal human cells is mediated by HsRAD51 recombinase.
AU Xia S J; Shammas M A; Shmookler Reis R J
CS Department of Biochemistry and Molecular Biology, University of Arkansas for Medical Sciences, Little Rock 72205, USA.
SO MOLECULAR AND CELLULAR BIOLOGY, (1997 Dec) 17 (12) 7151-8.
Journal code: NGY. ISSN: 0270-7306.
CY United States
DT Journal; Article; (JOURNAL ARTICLE)
LA English
FS Priority Journals
EM 199802
AB Normal diploid cells have a limited replicative potential in culture, with progressively increasing interdivision time. Rarely, cell lines arise which can divide indefinitely; like tumor cells, such "immortal" lines display frequent chromosomal aberrations which may reflect high rates of recombination. Recombination frequencies within a plasmid substrate were 3.5-fold higher in nine immortal human cell lines than in six untransformed cell strains. Expression of HsRAD51, a human homolog of the yeast **RAD51** and Escherichia coli recA recombinase genes, was 4.5-fold higher in immortal cell lines than in mortal cells. Stable transformation of human fibroblasts with simian virus 40 large T antigen prior to cell immortalization increased both chromosomal recombination and the level of HsRAD51 transcripts by two- to fivefold. T-antigen induction of recombination was efficiently blocked by introduction of HsRAD51 antisense (but not control) oligonucleotides spanning the initiation codon, implying that HsRAD51 expression mediates augmented recombination. Since **p53** binds and inactivates HsRAD51, T-antigen-**p53** association may block such inactivation and liberate HsRAD51. Upregulation of HsRAD51 transcripts in T-antigen-transformed and other immortal cells suggests that recombinase activation can also occur at the RNA level and may facilitate cell transformation to immortality.

L2 ANSWER 20 OF 36 MEDLINE DUPLICATE 10
AN 97338121 MEDLINE
DN 97338121
TI RAB22 and RAB163/mouse **BRCA2**: proteins that specifically interact with the **RAD51** protein.
AU Mizuta R; LaSalle J M; Cheng H L; Shinohara A; Ogawa H; Copeland N; Jenkins N A; Lalande M; Alt F W
CS Howard Hughes Medical Institute, Children's Hospital, Boston, MA 02115, USA.
NC AI315714 (NIAID)
CA42335 (NCI)
SO PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA, (1997 Jun 24) 94 (13) 6927-32.
Journal code: PV3. ISSN: 0027-8424.
CY United States
DT Journal; Article; (JOURNAL ARTICLE)
LA English
FS Priority Journals; Cancer Journals
OS GENBANK-U93583
EM 199709
EW 19970904

AB The human **RAD51** protein is a homologue of the bacteria RecA and yeast **RAD51** proteins that are involved in homologous recombination and DNA repair. **RAD51** interacts with proteins involved in recombination and also with **tumor suppressor** proteins **p53** and breast cancer susceptibility gene 1 (**BRCA1**). We have used the yeast two-hybrid system to clone murine cDNA sequences that encode two **RAD51**-associated molecules, RAB22 and RAB163. RAB163 encodes the C-terminal portion of mouse **BRCA2**, the homologue of the second breast cancer susceptibility gene protein in humans, demonstrating an in vitro association between **RAD51** and **BRCA2**. RAB22 is a novel gene product that also interacts with **RAD51** in vitro. To detect **RAD51** interactions in vivo, we developed a transient nuclear focus assay that was used to demonstrate a complete colocalization of RAB22 with **RAD51** in large nuclear foci.

L2 ANSWER 21 OF 36 MEDLINE DUPLICATE 11
AN 1998026204 MEDLINE
DN 98026204
TI Interaction of **p53** with the human **Rad51** protein.
AU Buchhop S; Gibson M K; Wang X W; Wagner P; Sturzbecher H W; Harris C C
CS Institut fur Humangenetik Universitat zu Lubeck, Ratzeburger Allee 160, D-23538 Lubeck, Germany.
SO NUCLEIC ACIDS RESEARCH, (1997 Oct 1) 25 (19) 3868-74.
Journal code: O8L. ISSN: 0305-1048.
CY ENGLAND: United Kingdom
DT Journal; Article; (JOURNAL ARTICLE)
LA English
FS Priority Journals; Cancer Journals
EM 199801
EW 19980104
AB **p53** is thought to function in the maintenance of genomic stability by modulating transcription and interacting with cellular proteins to influence the cell cycle, DNA repair and apoptosis. **p53** mutations occur in >50% of human cancers, and cells which lack wild type **p53** accumulate karyotypic abnormalities such as amplifications, deletions, inversions and translocations. We propose that **p53** hinders these promiscuous recombinational events by interacting with cellular recombination and repair machinery. We recently reported that **p53** can directly bind in vivo to human **Rad51** (hRad51) protein and in vitro to its bacterial homologue RecA. We used GST-fusion and his-tagged protein systems to further investigate the physical interaction between **p53** and hRad51, homologue of the yeast **Rad51** protein that is involved in recombination and DNA double strand repair. The hRad51 binds to wild-type **p53** and to a lesser extent, point mutants 135Y, 249S and 273H. This binding is not mediated by a DNA or RNA intermediate. Mapping studies using a panel of **p53** deletion mutants indicate that hRad51 could bind to two regions of **p53**; one between amino acids 94 and 160 and a second between 264 and 315. Addition of anti-**p53** antibody PAb421 (epitope 372-381 amino acids) inhibited the interaction with hRad51. In contrast, **p53** interacts with the region between aa 125 and 220 of hRad51, which is highly conserved among **Rad51** related proteins from bacteria to human. In Escherichia coli ecA protein, this region is required for homo-oligomerization, suggesting that **p53** might disrupt the interaction between

RecA and **Rad51** subunits, thus inhibiting biochemical functions of **Rad51** like proteins. These data are consistent with the hypothesis that **p53** interaction with hRAD51 may influence DNA recombination and repair and that additional modifications of **p53** by mutation and protein binding may affect this interaction.

L2 ANSWER 22 OF 36 MEDLINE
AN 97315195 MEDLINE
DN 97315195
TI **Brca2** is required for embryonic cellular proliferation in the mouse.
AU Suzuki A; de la Pompa J L; Hakem R; Elia A; Yoshida R; Mo R; Nishina H; Chuang T; Wakeham A; Itie A; Koo W; Billia P; Ho A; Fukumoto M; Hui C C; Mak T W
CS Amgen Institute, Toronto, Ontario, Canada.
SO GENES AND DEVELOPMENT, (1997 May 15) 11 (10) 1242-52.
Journal code: FN3. ISSN: 0890-9369.
CY United States
DT Journal; Article; (JOURNAL ARTICLE)
LA English
FS Priority Journals
EM 199708
EW 19970804
AB Mutations of the **tumor suppressor** gene **BRCA2** are associated with predisposition to breast and other cancers. Homozygous mutant mice in which exons 10 and 11 of the **Brca2** gene were deleted by gene targeting (**Brca2** (10-11)) die before day 9.5 of embryogenesis. Mutant phenotypes range from severely developmentally retarded embryos that do not gastrulate to embryos with reduced size that make mesoderm and survive until 8.5 days of development. Although apoptosis is normal, cellular proliferation is impaired in **Brca2**(10-11) mutants, both in vivo and in vitro. In addition, the expression of the cyclin-dependent kinase inhibitor p21 is increased. Thus, **Brca2**(10-11) mutants are similar in phenotype to **Brca1**(5-6) mutants but less severely affected. Expression of either of these two genes was unaffected in mutant embryos of the other. This study shows that **Brca2**, like **Brca1**, is required for cellular proliferation during embryogenesis. The similarity in phenotype between **Brca1** and **Brca2** mutants suggests that these genes may have cooperative roles or convergent functions during embryogenesis.

L2 ANSWER 23 OF 36 BIOSIS COPYRIGHT 1999 BIOSIS
AN 1997:420184 BIOSIS
DN PREV199799719387
TI Association of **BRCA1** with **Rad51** in meiotic and mitotic cells.
AU Livingston, D. (1); Scully, R.; Chen, J.; Plug, A.; Xiao, Y.; Weaver, D.; Feunteun, J.; Ashley, T.
CS (1) Dana-Farber Cancer Inst., Harvard Med. Sch., Boston, MA USA
SO FASEB Journal, (1997) Vol. 11, No. 9, pp. A1015.
Meeting Info.: 17th International Congress of Biochemistry and Molecular Biology in conjunction with the Annual Meeting of the American Society for Biochemistry and Molecular Biology San Francisco, California, USA August 24-29, 1997
ISSN: 0892-6638.
DT Conference; Abstract
LA English

L2 ANSWER 24 OF 36 MEDLINE DUPLICATE 12
AN 97271893 MEDLINE
DN 97271893
TI Embryonic lethality and radiation hypersensitivity mediated by **Rad51** in mice lacking **Brca2** [see comments].
CM Comment in: Nature 1997 Apr 24;386(6627):761, 763
AU Sharan S K; Morimatsu M; Albrecht U; Lim D S; Regel E; Dinh C; Sands A; Eichele G; Hasty P; Bradley A
CS Howard Hughes Medical Institute, Baylor College of Medicine, Houston, Texas 77030, USA.
SO NATURE, (1997 Apr 24) 386 (6627) 804-10.
Journal code: NSC. ISSN: 0028-0836.
CY ENGLAND: United Kingdom
DT Journal; Article; (JOURNAL ARTICLE)
LA English
FS Priority Journals; Cancer Journals
OS GENBANK-U65594
EM 199707
AB Inherited mutations in the human **BRCA2** gene cause about half of the cases of early-onset breast cancer. The embryonic expression pattern of the mouse **Brca2** gene is now defined and an interaction identified of the **Brca2** protein with the DNA-repair protein **Rad51**. Developmental arrest in **Brca2**-deficient embryos, their radiation sensitivity, and the association of **Brca2** with **Rad51** indicate that **Brca2** may be an essential cofactor in the **Rad51**-dependent DNA repair of double-strand breaks, thereby explaining the tumour-suppressor function of **Brca2**.

L2 ANSWER 25 OF 36 MEDLINE DUPLICATE 13
AN 1998126172 MEDLINE
DN 98126172
TI Mammalian **Rad51** protein: a RecA homologue with pleiotropic functions.
AU Vispe S; Defais M
CS Institut de Pharmacologie et de Biologie Structurale, CNRS, UPR 9062, Toulouse, France.
SO BIOCHIMIE, (1997 Oct) 79 (9-10) 587-92. Ref: 87
Journal code: A14. ISSN: 0300-9084.
CY France
DT Journal; Article; (JOURNAL ARTICLE)
General Review; (REVIEW)
(REVIEW, TUTORIAL)
LA English
FS Priority Journals
EM 199805
EW 19980502
AB During the last years, homologues of E coli RecA have been cloned in numerous species including man. These **Rad51** proteins share sequence as well as functional homologies with the bacterial protein. Human **Rad51** (HsRad51) is able to catalyze strand exchange in vitro between homologous DNAs, but with a lower efficiency compared to that of RecA. This suggests the requirement of additional factors. A very interesting feature of **Rad51** is its essential role in mouse which could mean that it has gained an essential function in cell growth. The interaction of HsRad51 with several **tumor suppressor** genes namely **p53**, **BRCA1** and **BRCA2** implies possible role(s) of this protein in tumorigenesis. Thus, the continued study

of **Rad51** should bring important insights not only into homologous recombination mechanisms but also into cell proliferation regulation.

L2 ANSWER 26 OF 36 MEDLINE DUPLICATE 14
AN 1998061098 MEDLINE
DN 98061098
TI Partial rescue of the prophase I defects of Atm-deficient mice by **p53** and p21 null alleles.
AU Barlow C; Liyanage M; Moens P B; Deng C X; Ried T; Wynshaw-Boris A
CS Laboratory of Genetic Disease Research, National Institute of Diabetes, Digestive and Kidney Disorders, Bethesda, Maryland 20892, USA.
SO NATURE GENETICS, (1997 Dec) 17 (4) 462-6.
Journal code: BRO. ISSN: 1061-4036.
CY United States
DT Journal; Article; (JOURNAL ARTICLE)
LA English
FS Priority Journals
EM 199803
EW 19980301
AB Patients with the human disorder ataxia-telangiectasia (A-T; refs 1,2) and Atm-deficient mice have a pleiotropic phenotype that includes infertility. Here we demonstrate that male gametogenesis is severely disrupted in Atm-deficient mice in the earliest stages of meiotic prophase I, resulting in apoptotic degeneration. Atm is required for proper assembly of **Rad51** onto the chromosomal axial elements during meiosis. In addition, **p53**, p21 and Bax are elevated in testes from Atm-deficient mice. To determine whether these elevated protein levels are important factors in the meiotic disruption of Atm-deficient mice, we analysed the meiotic phenotype of Atm/**p53** or Atm/p21 double mutants. In these double mutants, meiosis progressed to later stages but was only partly rescued. Assembly of **Rad51** foci on axial elements remained defective, and gametogenesis proceeded only to pachytene of prophase I. Previous results demonstrated that mice homozygous for a null mutation in **Rad51** (ref. 6) display an early embryonic lethal phenotype that can be partly rescued by removing **p53** and/or p21. Because Atm-deficient mice are viable but completely infertile, our studies suggest that the **Rad51** assembly defects and elevated levels of **p53**, p21 and Bax represent tissue-specific responses to the absence of Atm.

L2 ANSWER 27 OF 36 MEDLINE DUPLICATE 15
AN 97410308 MEDLINE
DN 97410308
TI Dynamic changes of **BRCA1** subnuclear location and phosphorylation state are initiated by DNA damage.
AU Scully R; Chen J; Ochs R L; Keegan K; Hoekstra M; Feunteun J; Livingston D M
CS The Dana-Farber Cancer Institute, Harvard Medical School, Boston, Massachusetts 02115, USA.
SO CELL, (1997 Aug 8) 90 (3) 425-35.
Journal code: CQ4. ISSN: 0092-8674.
CY United States
DT Journal; Article; (JOURNAL ARTICLE)
LA English
FS Priority Journals; Cancer Journals
EM 199711
EW 19971102

AB **BRCA1** localizes to discrete nuclear foci (dots) during S phase. Hydroxyurea-mediated DNA synthesis arrest of S phase MCF7 cells led to a loss of **BRCA1** from these structures. Ultraviolet light, mitomycin C, or gamma irradiation produced a similar effect but with no concurrent arrest of DNA synthesis. BARD1 and **Rad51**, two proteins associated with the **BRCA1** dots, behaved similarly. Loss of the **BRCA1** foci was accompanied by a specific, dose-dependent change(s) in the state of **BRCA1** phosphorylation. Three distinct DNA damaging agents preferentially induced this change in S phase. The S phase **BRCA1** phosphorylation response to DNA damage occurred in cells lacking, respectively, two DNA damage-sensing protein kinases, DNA-PK and Atm, implying that neither plays a prime role in this process. Finally, after **BRCA1** dot dispersal, **BRCA1**, BARD1, and **Rad51** accumulated, focally, on PCNA+ replication structures, implying an interaction of **BRCA1**/BARD1/**Rad51** containing complexes with damaged, replicating DNA. Taken together, the data imply that the **BRCA1** S phase foci are dynamic physiological elements, responsive to DNA damage, and that **BRCA1**-containing multiprotein complexes participate in a replication checkpoint response.

L2 ANSWER 28 OF 36 BIOSIS COPYRIGHT 1999 BIOSIS
AN 1998:21475 BIOSIS
DN PREV199800021475
TI Molecular mechanisms for infertility and cancer in ataxia telangiectasia.
AU Liyanage, M. (1); Barlow, C. (1); Moens, P. B. (1); Wangsa, D.; Deng, C.-X.; Wynshaw-Boris, A. (1); Ried, T.
CS (1) NIH, Bethesda, MD USA
SO Molecular Biology of the Cell, (Nov., 1997) Vol. 8, No. SUPPL., pp. 353A.
Meeting Info.: 37th Annual Meeting of the American Society for Cell Biology Washington, D.C., USA December 13-17, 1997 American Society for Cell Biology
. ISSN: 1059-1524.
DT Conference
LA English

L2 ANSWER 29 OF 36 MEDLINE DUPLICATE 16
AN 97160847 MEDLINE
DN 97160847
TI Association of **BRCA1** with **Rad51** in mitotic and meiotic cells.
AU Scully R; Chen J; Plug A; Xiao Y; Weaver D; Feunteun J; Ashley T; Livingston D M
CS The Dana-Farber Cancer Institute, Harvard Medical School, Boston, Massachusetts 02115, USA.
SO CELL, (1997 Jan 24) 88 (2) 265-75.
Journal code: CQ4. ISSN: 0092-8674.
CY United States
DT Journal; Article; (JOURNAL ARTICLE)
LA English
FS Priority Journals; Cancer Journals
EM 199704
EW 19970404
AB **BRCA1** immunostaining reveals discrete, nuclear foci during S phase of the cell cycle. Human **Rad51**, a homolog of bacterial RecA, behaves similarly. The two proteins were found to

colocalize in vivo and to coimmunoprecipitate. **BRCA1** residues 758-1064 alone formed **Rad51**-containing complexes in vitro. **Rad51** is also specifically associated with developing synaptonemal complexes in meiotic cells, and **BRCA1** and **Rad51** were both detected on asynapsed (axial) elements of human synaptonemal complexes. These findings suggest a functional interaction between **BRCA1** and **Rad51** in the meiotic and mitotic cell cycles, which, in turn, suggests a role for **BRCA1** in the control of recombination and of genome integrity.

L2 ANSWER 30 OF 36 MEDLINE DUPLICATE 17
AN 97441059 MEDLINE
DN 97441059
TI Arrest of the cell cycle by the tumour-suppressor **BRCA1** requires the CDK-inhibitor p21WAF1/CiP1.
AU Somasundaram K; Zhang H; Zeng Y X; Houvras Y; Peng Y; Zhang H; Wu G S; Licht J D; Weber B L; El-Deiry W S
CS Laboratory of Molecular Oncology and Cell Cycle Regulation, Howard Hughes Medical Institute, Department of Medicine, University of Pennsylvania School of Medicine, Philadelphia 19104, USA.
SO NATURE, (1997 Sep 11) 389 (6647) 187-90.
Journal code: NSC. ISSN: 0028-0836.
CY ENGLAND: United Kingdom
DT Journal; Article; (JOURNAL ARTICLE)
LA English
FS Priority Journals; Cancer Journals
EM 199712
EW 19971201
AB Much of the predisposition to hereditary breast and ovarian cancer has been attributed to inherited defects in the **BRCA1** tumour-suppressor gene. The nuclear protein **BRCA1** has the properties of a transcription factor, and can interact with the recombination and repair protein **RAD51**. Young women with germline alterations in **BRCA1** develop breast cancer at rates 100-fold higher than the general population, and **BRCA1** -null mice die before day 8 of development. However, the mechanisms of **BRCA1**-mediated growth regulation and tumour suppression remain unknown. Here we show that **BRCA1** transactivates expression of the cyclin-dependent kinase inhibitor p21WAF1/CIP1 in a **p53**-independent manner, and that **BRCA1** inhibits cell-cycle progression into the S-phase following its transfection into human cancer cells. **BRCA1** does not inhibit S-phase progression in p21-/- cells, unlike p21+/+ cells, and tumour-associated, transactivation-deficient mutants of **BRCA1** are defective in both transactivation of p21 and cell-cycle inhibition. These data suggest that one mechanism by which **BRCA1** contributes to cell-cycle arrest and growth suppression is through the induction of p21.

L2 ANSWER 31 OF 36 BIOSIS COPYRIGHT 1999 BIOSIS
AN 1998:110170 BIOSIS
DN PREV199800110170
TI Understanding the pleiotropic effects of Atm by modelling in the mouse.
AU Barlow, C.; Liyanage, M.; Brown, K. (1); Moens, P.; Deng, C. X.; Tagle, D. (1); Ried, T. (1); Wynshaw-Boris, A. (1)
CS (1) NHGRI and +NIDDK, NIH, Bethesda, MD USA
SO American Journal of Human Genetics, (Oct., 1997) Vol. 61, No. 4 SUPPL., pp. A47.

Meeting Info.: 47th Annual Meeting of the American Society of Human Genetics Baltimore, Maryland, USA October 28-November 1, 1997
ISSN: 0002-9297.
DT Conference
LA English

L2 ANSWER 32 OF 36 MEDLINE DUPLICATE 18
AN 97098692 MEDLINE
DN 97098692
TI A mutation in mouse **rad51** results in an early embryonic lethal that is suppressed by a mutation in **p53**.
AU Lim D S; Hasty P
CS Department of Biochemistry and Molecular Biology, M.D. Anderson Cancer Center, Houston, Texas 77030, USA.
SO MOLECULAR AND CELLULAR BIOLOGY, (1996 Dec) 16 (12) 7133-43.
Journal code: NGY. ISSN: 0270-7306.
CY United States
DT Journal; Article; (JOURNAL ARTICLE)
LA English
FS Priority Journals
EM 199704
EW 19970402
AB RecA in Escherichia coli and its homolog, ScRad51 in Saccharomyces cerevisiae, are known to be essential for recombinational repair. The homolog of RecA and ScRad51 in mice, MmRad51, was mutated to determine its function. Mutant embryos arrested early during development. A decrease in cell proliferation, followed by programmed cell death and chromosome loss, was observed. Radiation sensitivity was demonstrated in trophectoderm-derived cells. Interestingly, embryonic development progressed further in a **p53** null background; however, fibroblasts derived from double-mutant embryos failed to proliferate in tissue culture.

L2 ANSWER 33 OF 36 MEDLINE DUPLICATE 19
AN 96203121 MEDLINE
DN 96203121
TI **p53** is linked directly to homologous recombination processes via **RAD51**/RecA protein interaction.
AU Sturzbecher H W; Donzelmann B; Henning W; Knippschild U; Buchhop S
CS Heinrich-Pette-Institut fur Experimentelle Virologie und Immunologie an der Universitat Hamburg, Germany.
SO EMBO JOURNAL, (1996 Apr 15) 15 (8) 1992-2002.
Journal code: EMB. ISSN: 0261-4189.
CY ENGLAND: United Kingdom
DT Journal; Article; (JOURNAL ARTICLE)
LA English
FS Priority Journals
EM 199608
AB The tumour suppressor **p53** prevents tumour formation after DNA damage by halting cell cycle progression to allow DNA repair or by inducing apoptotic cell death. Loss of wild-type **p53** function renders cells resistant to DNA damage-induced cell cycle arrest and ultimately leads to genomic instabilities including gene amplifications, translocations and aneuploidy. Some of these chromosomal lesions are based on mechanisms that involve recombinatorial events. Here we report that **p53** physically interacts with key factors of homologous recombination: the human **RAD51** protein and its prokaryotic homologue RecA. In vitro, wild-type **p53** inhibits defined biochemical activities of RecA protein, such as three-way DNA strand exchange and single

strand DNA-dependent ATPase activity. In vivo, temperature-sensitive **p53** forms complexes with **RAD51** only in wild-type but not in mutant conformation. These observations suggest that functional wild-type **p53** may select directly the appropriate pathway for DNA repair and control the extent and timing of the production of genetic variation via homologous recombination. Gene amplification an other types of chromosome rearrangements involved in tumour progression might occur not only as result of inappropriate cell proliferation but as a direct consequence of a defect in **p53**-mediated control of homologous recombination processes due to mutations in the **p53** gene.

L2 ANSWER 34 OF 36 MEDLINE DUPLICATE 20
AN 97079679 MEDLINE
DN 97079679
TI Associations of UBE2I with RAD52, UBL1, **p53**, and **RAD51** proteins in a yeast two-hybrid system.
AU Shen Z; Pardington-Purtymun P E; Comeaux J C; Moyzis R K; Chen D J
CS Life Sciences Division, Los Alamos National Laboratories, New Mexico 87545, USA.
NC CA50519 (NCI)
SO GENOMICS, (1996 Oct 15) 37 (2) 183-6.
Journal code: GEN. ISSN: 0888-7543.
CY United States
DT Journal; Article; (JOURNAL ARTICLE)
LA English
FS Priority Journals
OS GENBANK-M74525; GENBANK-U38785
EM 199704
AB The yeast RAD52-dependent pathway is involved in DNA recombination and double-strand break repair. Yeast ubiquitin-conjugating enzyme UBC9 participates in S- and M-phase cyclin degradation and mitotic control. Using the human RAD52 protein as the "bait" in a yeast two-hybrid system, we have identified a human homolog of yeast UBC9, designated UBE2I, that interacts with RAD52, **RAD51**, **p53**, and a ubiquitin-like protein UBL1. These interactions are UBE2I-specific, since another DNA repair-related ubiquitin-conjugating enzyme, RAD6 (UBC2), does not interact with these proteins. The interaction of UBE2I with RAD52 is mediated by RAD52's self-association region. These results suggest that the RAD52-dependent processes, cell cycle control, **p53** -mediated pathway(s), and ubiquitination interact through human UBE2I.

L2 ANSWER 35 OF 36 MEDLINE
AN 96105011 MEDLINE
DN 96105011
TI Abrogation of **p53**-induced apoptosis by the hepatitis B virus X gene.
AU Wang X W; Gibson M K; Vermeulen W; Yeh H; Forrester K; Sturzbecher H W; Hoeijmakers J H; Harris C C
CS Laboratory of Human Carcinogenesis, National Cancer Institute, NIH, Besthesda, Maryland 20892-4255, USA.
SO CANCER RESEARCH, (1995 Dec 15) 55 (24) 6012-6.
Journal code: CNF. ISSN: 0008-5472.
CY United States
DT Journal; Article; (JOURNAL ARTICLE)
LA English
FS Priority Journals; Cancer Journals
EM 199603

AB The **p53 tumor suppressor** gene product is a transcriptional transactivator and a potent apoptotic inducer. The fact that many of the DNA tumor virus oncoproteins bind to **p53** and affect these **p53** functions indicates that this interaction is an important step in oncogenic transformation. We and others have recently demonstrated that the hepatitis B virus oncoprotein, HBx, can form a complex with **p53** and inhibit its DNA consensus sequence binding and transcriptional transactivator activity. Using a microinjection technique, we report here that HBx efficiently blocks **p53**-mediated apoptosis and describe the results of studies exploring two possible mechanisms of HBx action. First, inhibition of apoptosis may be a consequence of the failure of **p53**, in the presence of HBx, to upregulate genes, such as p21WAF1, Bax, or Fas, that are involved in the apoptotic pathway. Data consistent with this hypothesis include HBx reduction of **p53**-mediated p21WAF1 expression. Alternatively, HBx could affect **p53** binding to the TFIIH transcription-nucleotide excision repair complex as HBx binds to the COOH terminus of **p53** and inhibits its binding to XPB or XPD. Binding of **p53** to these constituents of the core TFIIH is a process that may be involved in apoptosis. Because the HBx gene is frequently integrated into the genome of hepatocellular carcinoma cells, inhibition of **p53**-mediated apoptosis by HBx may provide a clonal selective advantage for hepatocytes expressing this integrated viral gene during the early stages of human liver carcinogenesis.

L2 ANSWER 36 OF 36 BIOSIS COPYRIGHT 1999 BIOSIS
AN 1996:88694 BIOSIS
DN PREV199698660829
TI **P53** Is directly linked to homologous recombination processes via **RAD51**/RecA protein interaction.
AU Stuerzbecher, Horst-Werner; Donzelmann, Beate; Buchhop, Sabine
CS Heinrich-Pette-Inst. Exp. Virol. Immunol., Univ. Hamburg, Martinistr. 52, 20251 Hamburg Germany
SO Biological Chemistry Hoppe-Seyler, (1995) Vol. 376, No. SPEC. SUPPL., pp. S158.
Meeting Info.: Fall Meeting of the Gesellschaft fuer Biologische Chemie Hannover, Germany September 11-13, 1995
ISSN: 0177-3593.
DT Conference
LA English

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ALL L# QUERIES AND ANSWER SETS ARE DELETED AT LOGOFF
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